

## AERIAL PHOTOGRAPHY CAMERA SYSTEM FOR A HELICOPTER

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

5 The present invention relates to an aerial photography camera system for a helicopter. Particularly, the present invention relates to an aerial photography camera system in which a pilot may operate the helicopter and photograph objects, simultaneously.

#### 10 2. Description of the Relevant Art

An aerial photography technology by using a helicopter is first used for advertising things and then now the technology is very important to interview things, in case of wide area, mountain area, traffic jams, and etc. as a traffic and interviewing means for saving time.

15 In addition, it has been affected to improve a program rate by which the aerial photos are provided to watchers as an aerial image software in several fields, like news, documentary, drama, and etc. However, it is difficult to have a good quality image by using the aerial photography camera system for a helicopter. When all items of the helicopter capability and structure, the aerial photography camera system, operating  
20 system, and matching between camera handling technique and helicopter operating technique are acquired, good quality images are accomplished.

The conventional aerial photography camera system by using a helicopter has been developed by having steps of an early aerial photography camera system, a fixed type-aerial photography camera system, an aerial photography camera system by using  
25 a WESCAM camera, and etc.

First, the early aerial photography camera system is a general method that broadcasting stations photograph objects by using a helicopter. Cameraman operates a camera in opening in each side of the helicopter, therefore the cameraman should absolutely depend on an operation of a pilot, having very limited angle.

30 And the fixed aerial photography camera system uses several cameras. Several wide cameras are fixed on a fuselage and one camera is used for photographing objects by the cameraman described above way. So various images may be acquired by editing various images. But the fixed cameras have limitations to take images because of depending on the helicopter movement.

35 WESCAM camera is used for a most developed type for the aerial photography camera system to overcome above limitations. It is explained by referring to FIGs. 1 to

4.

FIG. 1 shows a transparent side view of a helicopter for an aerial photography camera by using a WESCAM camera.

FIG. 2 shows a transparent plane view of a helicopter for an aerial photography camera by using a WESCAM camera.

FIG. 3 shows a transparent front view of a helicopter for an aerial photography camera by using a WESCAM camera.

FIG. 4 shows a side view of a front part of the helicopter, in which the WESCAM is fixed on the front of the fuselage.

Referring to FIGs. 1 to 4, the helicopter by using the WESCAM camera comprises a fuselage 40, a WESCAM camera 5 for photographing images at an outside of a door in flight, an external mount 15 for supporting the WESCAM camera 5 on the door, and a recording device 20 for recording the photographed image. The WESCAM camera 5 externally fixed in the fuselage 40, has functions for zooming, tilting, focusing, and panning. Therefore, a cameraman in the helicopter may select wanted images by using a remote controller as watching a monitor 30. And the WESCAM camera 5 may be fixed on any part of the helicopter. And a lens and head of the WESCAM 5 are in an outer gimbal, and a body of the WESCAM camera 5 is installed inside of the helicopter. The aerial photography camera system prevents from shaking and photographs objects on the ground, 300 - 500mm apart from the helicopter. Additionally, the gimbal may be positioned on a front lower end of a nose like FIG. 4, thereby there is better advantage that the WESCAM camera may have a broaden view for objects than the convention method that the camera is installed on the side surface of the helicopter.

However, there are still problems of a view limitation and mismatching between a photographed image and a real image during editing the images because the pilot operates the helicopter and the cameraman photographs the objects, respectively.

## SUMMARY OF THE INVENTION

Therefore, the present invention has been devised to solve the problems involved in the prior art.

In an aspect of the present invention, there is provided an aerial photography camera system for a helicopter, comprising: camera fixed on a certain position on a fuselage, recording device for recording image signals transmitted from the camera, monitor for displaying images, and remote controller installed on cyclic pitch lever and collective pitch lever of a pilot's seat, for controlling the camera and the recording

device.

## BRIEF DESCRIPTION OF THE DRAWINGS

The above object and other features of the present invention will become more apparent by describing the preferred embodiment thereof with reference to the accompanying drawings, in which:

FIG. 1 shows a transparent side view of a helicopter for an aerial photography camera by using a WESCAM camera.

FIG. 2 shows a transparent plane view of a helicopter for an aerial photography camera by using a WESCAM camera.

FIG. 3 shows a front view of a helicopter for an aerial photography camera by using a WESCAM camera.

FIG. 4 shows a side view of a front part of the helicopter, in which the WESCAM camera is fixed on the front of the fuselage.

FIG. 5 shows a perspective of a helicopter for an aerial photography camera system according to the present invention.

FIG. 6 shows a perspective view of a pilot's seat of the helicopter in FIG. 5.

FIG. 7 shows an enlarged view of a cyclic pitch lever of FIG. 6.

FIG. 8a shows an enlarged view of a collective pitch lever of FIG. 6.

FIG. 8b shows an explaining diagram for using a control device installed in the collective pitch lever of FIG. 8a.

FIG. 9 shows a block diagram of an aerial photography camera system for photographing objects and operating the helicopter by a pilot according to the present invention.

FIG. 10 shows a flowchart for explaining process of the aerial photography camera system for photographing objects and operating the helicopter by a pilot according to the present invention.

## DETAILED DESCRIPTION OF THE INVENTION

The preferred embodiment of the present invention will now be explained with reference to the accompanying drawings.

FIG. 5 shows a perspective of a helicopter for an aerial photography camera system according to the present invention.

FIG. 6 shows a detailed diagram of a pilot's seat of the helicopter in FIG. 5.

FIG. 7 shows an enlarged view of a cyclic pitch lever of FIG. 6.

FIG. 8a shows an enlarged view of a collective pitch lever of FIG. 6.

FIG. 8b shows an explaining diagram for using a control device installed in the collective pitch lever of FIG. 8a.

FIG. 9 shows a block diagram of an aerial photography camera system for photographing objects and operating the helicopter by a pilot according to the present invention.

Referring to FIG 5, the present invention comprises a fuselage 40 of flying for aerial photographing, a main rotor 50 and a tail rotor 55, a camera unit 10 of photographing objects in flight, landing skid 45, and an operating unit 80. The main rotor 50 and the tail rotor 55 are propellers for flying the helicopter in flight. A camera 10a fixed a nose of the helicopter, may change directions and photographs objects in flight. The landing skid 45 supports the fuselage 40 from the ground during landing and guides a safe landing. And the operating unit 80 controls a pilot's operation and aerial photographing.

Referring to FIG. 6, the operating unit 80 may be explained in detail.

The operating unit 80 inside of the fuselage 40 includes cyclic pitch lever 60 having a stick shape, a collective pitch lever 70, a monitor 30, and a recording device 20 (not shown in this figure, referring to FIG. 9). The cyclic pitch lever 60 is two(one for pilot and the other for copilot) for regulating direction of the helicopter by controlling the main rotor 50, controlling a zooming function of the camera 10a, and switching on/off the recording device 20. The collective pitch lever 70 regulates direction of the camera 10a and a focus of objects. The monitor 30 displays images transmitted from the camera 10a. And the recording device 20 records image signals transmitted from the camera 10a on tapes.

The cyclic pitch lever 60 referring to FIG. 7, installed in a pilot's seat and in a copilot's seat respectively, regulates a direction of the main rotor 50, in general. In accordance with the present invention, two buttons are installed on one of the two cyclic pitch lever 60. In other words, a zoom control button 60b for controlling a zoom function of the camera 10a and a recording device switching button 60a for controlling on/off functions of the recording device 20 are installed on one the cyclic pitch lever 60, respectively.

In addition, the collective pitch lever 70, referring to FIGs. 8a and 8b regulates a direction of the main rotor 50 like the cyclic pitch lever 60. The direction for proceeding the collective pitch lever 70 is only for forward and backward. According to the present invention, the collective pitch lever 70 has a camera operating key 70a for regulating a pan and tilt function, i.e. camera direction, as well as focusing function of the camera 10a, by aiming a simple collective pitch lever movement.

Additionally, the camera unit 10 includes the camera 10a for photographing objects according to the helicopter proceeding direction or the controlled direction, and a gimbal 10b for moving the camera 10a according to the camera operating key 70a of the collective pitch lever 70.

5 The operation of the present invention comprised by the above configurations is explained by referring to FIG. 9.

At first, a pilot whirls off the helicopter as sitting on the pilot's seat.

The pilot turns on the recording device 20 by using the recording device switching button 60a of the cyclic pitch lever 60 for photographing and then operates  
10 the camera operating key 70a of the collective pitch lever 70 to a wanted object. The gimbal 10b moves the camera 10a to a wanted position by an operated signal. After the camera 10a moves to the position, the camera 10a photographs the objects. And image signal of the objects are applied to and recorded on the recording device 20. The recording device 20 records the image signals transmitted from the camera 10a and  
15 applies the images to the monitor 30 such that the pilot watches the images, simultaneously.

When the images are displayed on the monitor 30, the pilot determines whether the camera position is proper or not. The pilot regulates focus by using the camera operating key 70a of the collective pitch lever or changes the camera position by the  
20 gimbal 10b of the camera unit 10 in case that the camera position is not proper. Additionally, the pilot may set a new zooming condition by regulating the zoom control button 60b of the collective pitch lever 70 in case of changing the zoom.

FIG. 10 shows a flowchart for explaining process of the aerial photography camera system for photographing objects and operating the helicopter by a pilot  
25 according to the present invention.

At first, the pilot whirls off the helicopter(S100).

The pilot determines whether it is proper to photograph or not in flight(S200).

According to determination result in S200, the pilot turns on the recording device 20 by using the recording device switching button 70a of the cyclic pitch lever  
30 60 in case that the pilot likes to photograph(S300). Otherwise, the pilot tries to determine photographing objects in S200 repeatedly, until the pilot determines the objects.

When the recording device 20 is on(S300), the camera 10a transmits image signals to the recording device 20 after photographing the objects corresponding to the  
35 fixed position(S400).

When the image signals are transmitted to the recording device 20(S400), the

recording device 20 records the image signals on tape by receiving the image signals(S500).

The recording device 20 applies the image signals to the monitor 30 and the images are displayed on the monitor 30(S600).

5 And then the pilot determines whether the image is proper, i.e., photographing direction is proper(S700).

According to determination result in S700, it goes to S900, in case that the photographing direction is proper. The pilot regulates the gimbal 10b for moving the camera 10a by operating the camera operating key 70a of the collective pitch lever 70,  
10 in case that the direction is not proper(S800).

After the photographing direction is regulated in S800, the pilot determines that the focus of the camera 10a is proper(S900).

In case that the focus is proper, it goes to S1100. Otherwise, the pilot operates the camera operating key 70a of the collective pitch lever 70 for correcting the focus of  
15 the camera 10a(S1000).

After correcting the focus in S1000, the pilot determines whether the zoom of the camera 10a is proper(S1100).

According to determination result in S1100, the recording operation is proceeding in case that the zoom is proper. But, the pilot operates the zoom control  
20 button 60b of the cyclic pitch lever 60 to correct the zoom in case that the zoom is not proper(S1200).

The pilot may operate the helicopter and photograph the objects with the helicopter operating means, simultaneously. There is no doubt that the pilot should be an expert capable of photographing the objects as well as operating the helicopter,  
25 simultaneously.

It is established that a pilot may operate the helicopter and photograph the objects by using the aerial photography camera system through the above process.

As explained, the aerial photography camera system for the helicopter according to the present invention, comprising a camera installed on a certain position  
30 of the helicopter, a recording device for recording image signals which are photographed from the camera, a monitor installed in front of a pilot's seat for displaying the recorded images, and operating keys installed on cyclic pitch lever and collective pitch lever for regulating focus, zoom, and direction of the camera, in order that the pilot may simultaneously operate the helicopter and photograph objects.  
35 Thereby, it is possible to have better images than a cameraman photographs the objects depending on the pilot's operation.

Many modifications and variations of the present invention are possible in light of the above teachings. Therefore, it is to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

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#### INDUSTRIAL APPLICABILITY

The aerial photography camera system for photographing objects and operating helicopter by one pilot, is used for broadcasting, military purpose, and other various parts because one pilot selects wanted images as operating the helicopter. Therefore,  
10 better images may be recorded than images photographed by a cameraman requiring co-operation with the pilot in the prior art.